

### LISTING OF THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the Subject Application:

1-15 (Canceled).

16. (Currently Amended) A method of ~~creating a composition of matter with forming a non-stoichiometric nanoscale powder having one or more modified properties comprising:~~

selecting a powder form of a stoichiometric metal compound comprising at least one metal and at least one element selected from the group consisting of: C, O, N, B, S, H, Se, Te, In, Sb, Al, Ni, F, P, Cl, Br, I, Si, and Ge;

adding at least one dopant element to the metal compound to form a mixture, wherein the at least one dopant element has a valency different than a valency of an electropositive element in the metal compound;

processing the mixture at a temperature greater than the solid state reaction temperature of the mixture to produce a non-stoichiometric nanoscale powder form of a substance comprising producing via high temperature processing a nanoscale powder form of a substance from the at least one dopant element and the metal compound, wherein the producing results in the at least one dopant element is combined being in the lattice of the metal compound and wherein the resulting compound comprises producing results in a compound comprising three or more elements;

wherein combining the at least one dopant element into the lattice of the metal compound modifies at least one property of the metal compound; and

the nanoscale powder form of the substance is substantially compositionally uniform.

17. (Previously Presented) The method of claim 16 wherein the at least one metal in the metal compound is selected from the group consisting of Ti, Mn, Fe, Ni, Zn, Cu, Sr, Y, Zr, Ta, W, Se, V, Co, In, Li, Hf, Nb, Mo, Sn, Sb, Al, Ce, Pr, Be, Np, Pa, Gd, Dy, Os, Pt, Pd, Ag, Eu,

Er, Yb, Ba, Ga, Cs, Na, K, Mg, Pm, Pr, Ni, Bi, Tl, Ir, Rb, Ca, La, Ac, Re, Hg, Cd, As, Th, Nd, Th, Md, and Au.

18. *(Previously Presented)* The method of claim 16 wherein the at least one dopant element is combined into the lattice in a concentration greater than 1% over the stoichiometric values.

19. *(Previously Presented)* The method of claim 16 wherein the property is selected from the group consisting of: electrical conductivity, dielectric constant, dielectric strength, dielectric loss, polarization, permittivity, critical current, superconductivity, piezoelectricity, mean free path, curie temperature, critical magnetic field, permeability, coercive force, magnetostriction, magnetoresistance, hall coefficient, BHmax, critical temperature, melting point, boiling point, sublimation point, phase transformation condition, vapor pressure, anisotropy, adhesion, density, hardness, ductility, elasticity, porosity, strength, toughness, surface roughness, coefficient of thermal expansion, thermal conductivity, specific heat, latent heat, refractive index, absorptivity, emissivity, dispersivity, scattering, polarization, acidity, basicity, reactivity, energy density, activation energy, free energy, entropy, frequency factor, bioactivity, biocompatibility, thermal coefficient of any property and pressure coefficient of any property.

20. *(Currently Amended)* The method of claim 16 wherein ~~the processing creating a composition of matter with one or more modified properties~~ comprises one or more of steps selected from the group consisting of: heating in inert atmosphere, heating in oxidizing atmosphere and heating in reducing atmosphere.

21. *(Currently Amended)* The method of claim 16 wherein ~~the processing creating a composition of matter with one or more modified properties~~ further modifies one or more of the following characteristics of the nanoscale powders: shape, surface area, morphology, surface characteristics, surface composition, size distribution and degree of agglomeration.

22. *(Currently Amended)* The method of claim 16 wherein the processing creating a composition of matter with one or more modified properties comprises plasma processing.

23. *(Currently Amended)* The method of claim 16 wherein the processing creating a composition of matter with one or more modified properties comprises a quench step after the mixture reaches the solid state reaction temperature.

24. *(Previously Presented)* The method of claim 16 wherein the at least one dopant element has a valency different than at least two metals in the metal compound.

25. *(Previously Presented)* The method of claim 16 wherein the nanoscale powder has an aspect ratio greater than 1.

26. *(Currently Amended)* A method of creating a composition of matter forming a non-stoichiometric nanoscale powder comprising:

selecting a powder form of a stoichiometric metal compound comprising at least one metal and at least one element selected from the group consisting of C, O, N, B, S, H, Se, Te, In, Sb, Al, Ni, F, P, Cl, Br, I, Si, and Ge;

adding at least one dopant element to the metal compound to form a mixture, wherein the at least one dopant element has a valency different than a valency of an electropositive element in the metal compound;

processing the mixture at a temperature greater than the solid state reaction temperature of the mixture to produce a non-stoichiometric nanoscale powder form of a substance comprising producing via high temperature processing a nanoscale powder form of a substance from the at least one dopant element and the metal compound, wherein the producing results in the at least one dopant element is combined being in the lattice of the metal compound and wherein the resulting compound comprises producing results in a compound comprising three or more elements;

wherein combining the at least one dopant element into the lattice of the metal compound modifies at least one property of the metal compound; and

the nanoscale powder form of the substance exhibits a gradient composition.

27. *(Previously Presented)* The method of claim 26 wherein the at least one metal in the metal compound is selected from the group consisting of Ti, Mn, Fe, Ni, Zn, Cu, Sr, Y, Zr, Ta, W, Sc, V, Co, In, Li, Hf, Nb, Mo, Sn, Sb, Al, Ce, Pr, Be, Np, Pa, Gd, Dy, Os, Pt, Pd, Ag, Eu, Er, Yb, Ba, Ga, Cs, Na, K, Mg, Pm, Pr, Ni, Bi, Tl, Ir, Rb, Ca, La, Ac, Re, Hg, Cd, As, Th, Nd, Tb, Md, and Au.

28. *(Previously Presented)* The method of claim 26 wherein the at least one dopant element is combined into the lattice in a concentration greater than 1 % over the stoichiometric values.

29. *(Previously Presented)* The method of claim 26 wherein the property is selected from the group consisting of: electrical conductivity, dielectric constant, dielectric strength, dielectric loss, polarization, permittivity, critical current, superconductivity, piezoelectricity, mean free path, curie temperature, critical magnetic field, permeability, coercive force, magnetostriction, magnetoresistance, hall coefficient, BHmax, critical temperature, melting point, boiling point, sublimation point, phase transformation condition, vapor pressure, anisotropy, adhesion, density, hardness, ductility, elasticity, porosity, strength, toughness, surface roughness, coefficient of thermal expansion, thermal conductivity, specific heat, latent heat, refractive index, absorptivity, emissivity, dispersivity, scattering, polarization, acidity, basicity, reactivity, energy density, activation energy, free energy, entropy, frequency factor, bioactivity, biocompatibility, thermal coefficient of any property and pressure coefficient of any property.

30. *(Currently Amended)* The method of claim 26 wherein the processing creating a composition of matter comprises one or more of steps selected from the group consisting of heating in inert atmosphere, heating in oxidizing atmosphere and heating in reducing atmosphere.

31. *(Currently Amended)* The method of claim 26 wherein the processing creating a composition of matter comprises a combustion step.

32. *(Currently Amended)* The method of claim 26 wherein the processing creating a composition of matter comprises plasma processing.

33. *(Currently Amended)* The method of claim 26 wherein the processing creating a composition of matter comprises a quench step after the mixture reaches the solid state reaction temperature.

34. *(Previously Presented)* The method of claim 26 wherein the at least one dopant element has a valency different than at least two metals in the metal compound.

35. *(Previously Presented)* The method of claim 26 wherein the nanoscale powder has an aspect ratio greater than 1.

36-39. *(Canceled)*

40. *(Currently Amended)* The method of claim 26 wherein the processing creating a composition of matter further modifies one or more of the following characteristics of the nanoscale powders: shape, surface area, morphology, surface characteristics, surface composition, size distribution and degree of agglomeration.

41-52. *(Canceled)*

53. *(Currently Amended)* The method of claim 16 wherein the processing creating a composition of matter comprises a combustion step.